

**WHAT IS CLAIMED IS:**

1           1. A system for providing a private mobile communication service, comprising:

2           a public base transceiver station disposed within a public/private common cell area and  
3           providing a public mobile communication service;

4           a private base transceiver station disposed within said public/private common cell area and  
5           providing a private mobile communication service; and

6           a first mobile station establishing a radio communication channel with the both the public  
7           base transceiver station and the private base transceiver station, when the first mobile station moves  
8           from a public-only cell area to said public/private common cell area, said first mobile station  
9           determining whether an identifier indicating a request for the private mobile communication service  
10          is added to a dialed phone number entered by a user, establishing a traffic channel with the private  
11          base transceiver station when it is determined that the identifier is added to the dialed phone number,  
12          and establishing a traffic channel with the public base transceiver station when it is determined that  
13          the identifier is not added to the dialed phone number

1           2. The system as set forth in claim 1, further comprising:

2           a private communication service apparatus verifying whether the first mobile station is a  
3           subscriber to the private mobile communication service, when a request for establishing a radio  
4           communication channel is received by the private base transceiver station from the first mobile  
5           station, establishing a radio communication channel, to enable telephonic communication, with the

6 private base transceiver station when it is verified that the first mobile station is a subscriber to the  
7 private mobile communication service, and establishing a traffic channel over a network to a called  
8 party corresponding to the dialed phone number, if a traffic channel request is received from the first  
9 mobile station with which the radio communication channel is established.

1 3. The system as set forth in claim 2, said network being a public mobile communication  
2 network through a public switched telephone network when said called party corresponds to a second  
3 mobile station located in the public-only cell area.

1 4. The system as set forth in claim 2, said network being a wired network when said called  
2 party corresponds to an extension phone connected to a private branch exchange within said private  
3 communication service apparatus.

1 5. The system as set forth in claim 2, said network being a public mobile communication  
2 network accessed by way of a Public Switched Telephone Network (PSTN)/Integrated Services  
3 Digital Network (ISDN), when said called party corresponds to a mobile station not registered as  
4 belonging to the public/private common cell area.

1 6. The system as set forth in claim 2, said network being a private wireless network by way  
2 of said private base transceiver station, when said called party corresponds to a second mobile station  
3 disposed within said public/private common cell area and registered as belonging to said

public/private common cell area.

7. The system as set forth in claim 1, wherein the identifier indicating a request for the private mobile communication service is a character # or a character \*.

8. The system as set forth in claim 1, said first mobile station comprising:  
a private network control unit for performing communication with said private base transceiver station using a private mobile communication service-only frequency channel by controlling a private network Radio Frequency (RF) unit, when the first mobile station is operated as a private network mobile phone when it is determined that the identifier is added to the dialed phone number; and

a public network mobile phone unit utilizing a main control unit for performing communication with said public base transceiver station using a public mobile communication service-only frequency channel by controlling a public network Radio Frequency (RF) unit, when the first mobile station is operated as a public network mobile phone when it is determined that the identifier is not added to the dialed phone number.

9. The system as set forth in claim 8, said first mobile station further comprising an antenna matching unit that receives RF signals in different frequency bands of private and public mobile communication services-only channels, respectively, through an antenna, separates the RF signals, and matches the separated RF signals with the corresponding private or public network Radio

5 Frequency (RF) units, and transmits RF signals from the private or public network Radio Frequency  
6 (RF) units through the antenna.

1 10. The system as set forth in claim 2, the private communication service apparatus  
2 comprising:

3 a private branch exchange establishing a traffic channel with a local extension telephone  
4 through a wired local network, when a request for establishing a traffic channel with the local  
5 extension telephone is received from the first mobile station;

6 the private branch exchange establishing a traffic channel with a general telephone through  
7 a public switched telephone network, when a request for establishing a traffic channel with a general  
8 telephone is received from the first mobile station;

9 the private branch exchange establishing a traffic channel over a private mobile  
10 communication network, when a request for establishing a traffic channel with a mobile station of  
11 another service subscriber located in the public/private common cell area is received from the first  
12 mobile station;

13 a private base station controller verifying whether the first mobile station is a subscriber to  
14 the private mobile communication service, when the first mobile station requests the private base  
15 station controller to establish a radio communication channel through the private base transceiver  
16 station; and

17 the private base station controller establishing a radio communication channel, when the first  
18 mobile station is verified to be a subscriber to the private mobile communication service;

19 the private base station controller transmitting traffic channel request signals received  
20 through the private base transceiver station to the private branch exchange; and

21 the private base station controller establishing a traffic channel with a mobile terminal of  
22 another service subscriber through the private base transceiver station in response to a request for  
23 establishment of a traffic channel with the mobile terminal of the service subscriber, the request  
24 being received from the private branch exchange.

1 11. The system as set forth in claim 1, wherein the first mobile station sends a signal  
2 indicating that the first mobile station is busy to the public base transceiver station when a traffic  
3 channel request signal is received through the public base transceiver station while the first mobile  
4 station is provided with the private mobile communication service through the private base  
5 transceiver station.

1 12. A method of processing a call using a private mobile communication service system,  
2 comprising steps of:

3 when a mobile station moves from a public-only cell area to a public/private common cell  
4 area, establishing a radio communication channel between said mobile station and a public base  
5 transceiver station disposed within said public/private common cell area and providing a public  
6 mobile communication service, while also establishing another radio communication channel  
7 between said mobile station and a private base transceiver station disposed within said public/private  
8 common cell area and providing a private mobile communication service;

9 determining if there is a call request, indicative of a call to a called party, by detecting a  
10 dialed phone number input by said mobile station;

11 checking for an identifier, indicating a request for said private mobile communication service,  
12 added to said phone number;

13 establishing a traffic channel between said mobile station and said public base transceiver  
14 station to receive the public mobile communication service, when the identifier is not added to the  
15 phone number; and

16 establishing a traffic channel between said mobile station and said private mobile  
17 communication service system to receive the private mobile communication service, when the  
18 identifier is added to the phone number.

1 13. The method according to claim 12, wherein the identifier indicating a request for the  
2 private mobile communication service is a character # or a character \*.

1 14. The method as set forth in claim 12, further comprising steps of:  
2 verifying whether the mobile station is a subscriber to the private mobile communication  
3 service, when a request for establishing a radio communication channel is received by the private  
4 base transceiver station from the mobile station;

5 establishing a radio communication channel, to enable telephonic communication, between  
6 a private communication service apparatus and the mobile station when it is verified that the first  
7 mobile station is a subscriber to the private mobile communication service; and

8 establishing a traffic channel over a network to the called party corresponding to the dialed  
9 phone number, if a traffic channel request is received from the mobile station with which the radio  
10 communication channel is established.

1 15. The method according to claim 14, further comprising:

2 sending a signal indicating that the mobile station is busy to the public base transceiver  
3 station when a traffic channel request signal is received through the public base transceiver station  
4 while the first mobile station is provided with the private mobile communication service through the  
5 private base transceiver station.

1 16. The method according to claim 14, the step of establishing a traffic channel over a  
2 network to a called party comprising steps of:

3 determining, when the called party is a called mobile terminal, whether the called mobile  
4 terminal is registered in said private communication service apparatus as a subscriber of said private  
5 mobile communication service;

6 switching the call to said private base transceiver station through a switch of a private branch  
7 exchange, when it is determined that the called mobile terminal is registered in said private  
8 communication service apparatus as a subscriber of said private mobile communication service, to  
9 enable telephonic communication between the mobile station and the called mobile terminal over  
10 a private wireless network; and

11 switching the call to a public switched telephone network through the switch of the private

12     branch exchange , when it is determined that the called mobile terminal is not registered in said  
13     private communication service apparatus as a subscriber of said private mobile communication  
14     service and establishing a traffic channel over the public switched telephone network and a public  
15     mobile communication network to enable telephonic communication between the mobile station and  
16     the called mobile terminal.